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of stags, parrots, and aras to enliven it. I was besides seized with a fit of ague, which made it impossible for me to pursue my exploration of the mountain, especially the Cerro Grande, a summit that rises above the limit of trees. Having reached the San Andres, after numerous accidents, which broke all my instruments, I was thereby prevented from taking any measurements of its height, which I might at random suppose to be above 4000 yards. It is, however, teeming with so many objects of observation that I may be allowed to hope it will be visited by geographers and geologists, who will be able to fill up the blanks of this my first excursion. I must caution them against an error which might cost them much time, namely, that of mistaking the name of the volcano for that of any neighbouring place or village, which is very often the case in desert countries, where mountains and rivers are nameless, or borrow their name from a town—as it is indeed the case with the famous Pico de Orizaba, which is also very frequently named after another neighbouring city, San Andres, the Cholchicomula of the Mexicans.

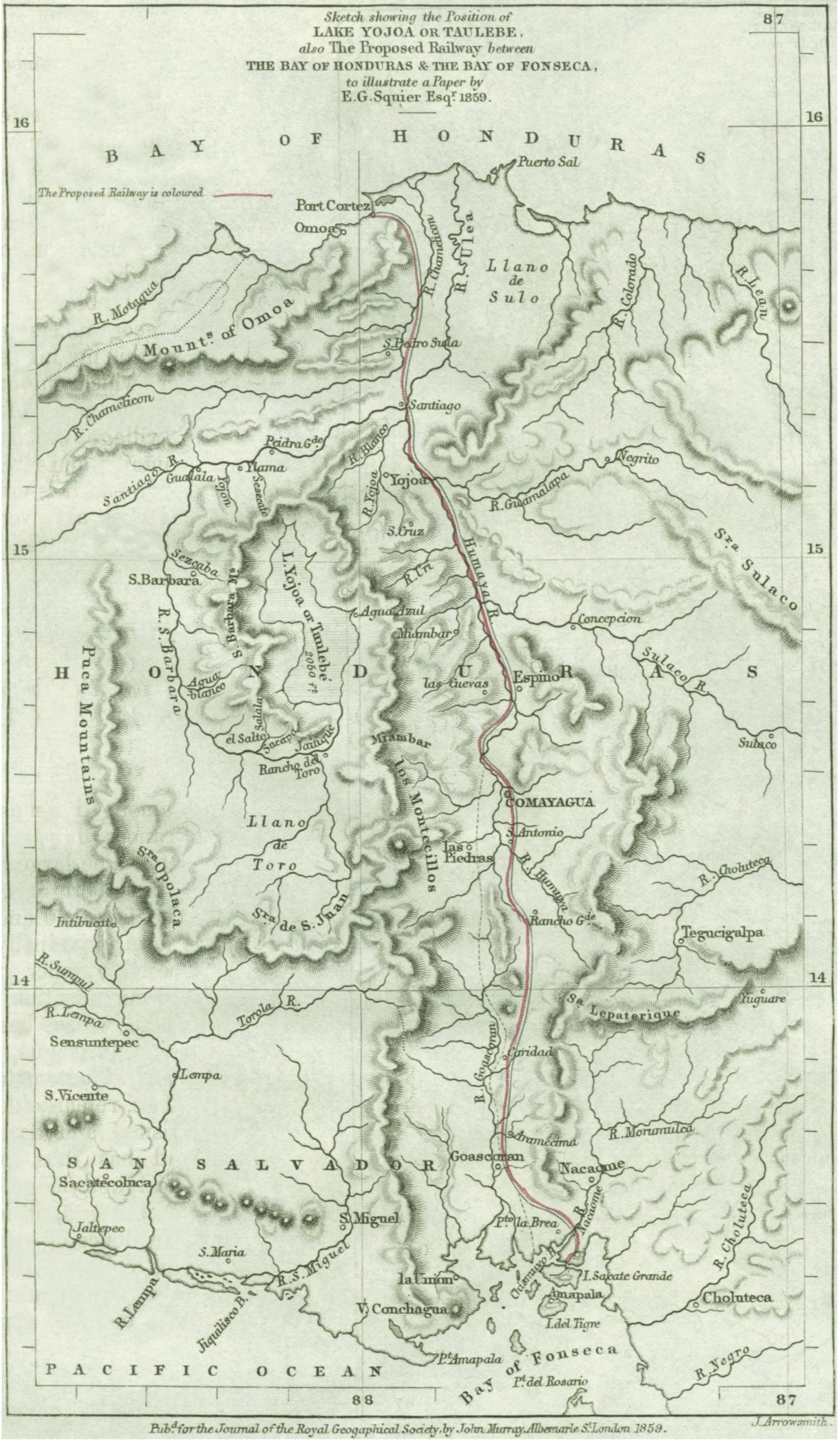
III.—*Some Account of the Lake of Yojoa or Taulebé, in Honduras, Central America.* By E. G. SQUIER, Esq., of the United States of America.

Read, January 10, 1859.

THE lakes of Central America are among its most interesting physical features, and, next to its volcanoes, most likely to arrest the attention of the intelligent traveller. The large and beautiful lake of Nicaragua, the *Cocibocca* of the aborigines, and its dependent lake of Managua or Leon, the first 120 and the second 60 miles in length, are those best known, principally on account of the facilities which they are supposed to offer in connection with the project of opening water communication between the Atlantic and Pacific Oceans. After these, we are best acquainted with the volcanic lakes of Masoya in Nicaragua, Ilopango in San Salvador, and Amatitlan and Atitlan in Guatemala. The lake of Itza, often called Peten, in Vera Paz, remarkable for its historical associations, has lately been visited and described by an intelligent traveller, M. Monelet, and has thus been brought within the range of modern geographical knowledge. Like Atitlan in Guatemala, and Masoya in Nicaragua, it is without an outlet; but, unlike them, betrays no evidence of volcanic origin. It is a closed reservoir, within which is collected the drainage of a considerable terrestrial basin; and in consequence of receiving the waters of a number of streams without any apparent outlet,

(ISTHMUS OF HONDURAS.)

Sketch showing the Position of
LAKE YOJOA OR TAULEBE,
also The Proposed Railway *between*
THE BAY OF HONDURAS & THE BAY OF FONSECA,
to illustrate a Paper by
E. G. Squier Esqr. 1859.



Pubd. for the Journal of the Royal Geographical Society, by John Murray, Albemarle St. London 1859.

it is called by the Indians *Nohkukén,* rendered by the Spaniards *Beber-mucho, i.e.* Drink-much.

There is another Central American lake in Honduras, of which less has been known than of the "mysterious lake of Itza" itself. Although 25 miles long by 8 miles broad at its widest part, it never appeared in any map of Central America before that of Baily, published in 1850. This circumstance will indicate in some degree the imperfect state of our geographical knowledge of the country prior to that date, and which, I am sorry to say, has not since greatly increased. The lake in question lies about 75 miles to the southward of the Bay of Honduras, between lat. 14° 40′ and 15° 5′ N., and long. 88° 3′ and 88° 15′ W. And while Itza is distinguished as having no outlet, Yojoa or Taulebé, the lake under notice, is equally remarkable from having several outlets. These are represented to be *ten* in number, one only being open, the others subterranean. In Baily's map it is represented as having five outlets, all open.

Our present information respecting this lake, although still incomplete, is derived from observations made in the month of February, 1858, by Lieut.-Colonel Edward Stanton, R.E., and the corps sent out under his command by Her Majesty's Government to verify the surveys for the projected Inter-oceanic Railway through Honduras, and from the examinations of Amory Edwards, Esq., of New York, agent to the Railway Company, who accompanied Colonel Stanton, and who afterwards, in July, 1858, made a second and longer visit to the lake, for the purpose of determining the truth of the popular stories regarding its extraordinary features.

As I have said, Lake Yojoa is about 25 miles long by from 5 to 8 miles broad, with an average depth of from 18 to 24 feet; and although distant but 45 miles in a direct line from the sea, it has an elevation above the ocean level, determined barometrically, of 2050 feet. It occupies the centre of one of those singular terrestrial basins, of which Honduras offers many examples, called, not inappropriately, *bolsones* or pockets. These are formed by the contortions of the mountain system of the country, the ranges of which frequently bend back on themselves, sometimes describing almost complete circles, and inclosing plains of varying extent and elevation. In these the waters of the mountain springs and rivulets are collected, often forming considerable rivers, which generally wind away to the sea through the narrow valleys which pierce the intervening and apparently unbroken mountain ranges. But sometimes they burst through the rocky barriers which impede their course, and after flowing for a while through deep *cañons,* between high cliffs, descend finally by a series of rapids and plunging cataracts to the level of the coast alluvions, where, uniting with other streams of equally turbulent origin, they flow away silently and majestically, through vast forest solitudes, to the ocean.

The high plains or *bolsones* of Sensenti, Intibucat, Otoro, Comayagua, Tegucigaessa, Olancho, and numerous others of inferior importance, answer to this description. At some remote period it is easy to believe that most, if not all, of these were mountain lakes or reservoirs, which were gradually drained by the slow excavations of their outlets, or suddenly liberated from their imprisonment by some convulsion of nature. Evidences of such an origin are not wanting, but their enumeration is foreign to my present purpose.

The lake of Yojoa occupies precisely one of the mountain basins or *bolsones* of which I have spoken, formed by the lapping or coiling round of the true cordilleras, or dividing ridge of the continent, which in Honduras constitutes a singular knot of mountains, known, in its various parts, by the different names of Merendon, Selaque, Opolaca, San Juan, Montecillos, Miambar, and Santa Barbara. It is, however, between the mountains of Miambar on the south and east, and those of Sta. Barbara on the north and west, that the lake is situated. These mountains have an average elevation of between 5000 and 6000 feet above the sea, and of about 3000 feet above the surface of the lake, which they shut in closely, leaving only narrow belts of marshy land near the water, in great part overflowed when the lake is full during the season of rains. The inner declivities of both ranges of mountains are abrupt, not generally available for agriculture, and only here and there used for cattle ranges. The outer slopes of these mountains are nevertheless comparatively gentle, descending towards the rivers Humuya and Sta. Barbara respectively by a series of terraces, intersected by numerous streams flowing in deep and narrow valleys. A number of these streams, it will be seen farther on, take their rise in the lake, whence they are fed by subterranean channels.

In fact, Lake Yojoa has but one open outlet, namely the river Jaitique at its southern extremity, which, in very dry seasons, is itself dry, but which generally has sufficient water to admit of the passage of canoes. It flows from the lake through a low meadow for upwards of a mile, then enters a narrow valley among the hills which connect the mountains of Santa Barbara and Miambar, and, describing a semicircle in its course, descends rapidly into the river Sta. Barbara. Before reaching the latter, however, it receives the united waters of two streams, called the Rio Sacapa and the Rio Salala, both connecting with the lake by subterranean channels. The underground passage of the Sacapa is half a mile long, commencing about two miles from the lake, for which distance, like the Jaitique, this stream flows through a long meadow covered with rushes and coarse grass.

In regard to these streams, as well as in relation to the remaining outlets of the lake, I cannot do better than subjoin the account of Mr. Edwards, contained in his private itinerary, communicated to me in August last (1858):—

"On the 7th of February, 1858, when I visited Lake Yojoa, in company with Colonel Stanton, the river Jaitique (the principal and only open outlet of the lake) was full at Rancho del Toro, the place of embarcation being not less than 7 feet deep. On the 9th of May following, the period of my second visit, I found the river at the same point dry, the lake having fallen 8 feet in the interval. I was informed that within the preceding week the lake had risen a few inches in consequence of several night showers, the occurrence of which indicated the approach of the rainy season.

"Proceeding to the village of Sacapa, on the river of the same name, I obtained a guide and followed up the stream for a mile to its point of emergence from its subterranean channel. I found the water *bulging up* from an orifice in the lime rock, near the base of a hill, not steep on this side, and covered with tropical vegetation. Groups of bamboos, the roots of which are nourished by the gushing waters, droop over the orifice, which is about 20 yards across. The stream falls rapidly from this source, descending 200 feet in a quarter of a mile. A mile below it is 50 feet broad, and between 2 and 3 feet deep. The amount of water does not vary during the rainy season, when the lake is full—a circumstance which shows that only a fixed amount of water can escape from the lake through the subterranean channel. The course of the stream is south-west, until it reaches the Rio Sta. Barbara. At a place called *El Salto* there is a fall of 60 feet perpendicular over a ledge of rocks. The channel leading from the lake to the hills is through a meadow, and the water sets into it with a perceptible current. In this channel there are a number of deep holes, called *pozos* or wells by the natives, which may be the places where the water enters its subterranean passage; but their bottoms seem to be mud, and there is no visible rush of waters downwards, whence I infer that the principal part of the water must enter from some point within the lake itself. This is the only place at the southern extremity of the lake, except through the river Jaitique, where its waters are seen to flow from it, but there are probably numerous openings in its limestone bed, through which they find an escape.

"This is evident from the fact that, after leaving Sacapa, and crossing a range of hills, a spur of the Sta. Barbara mountains, I found another outlet, called Rio Salala, a quarter as large as the Sacapa, emerging from beneath the limestone hills in like manner. It unites with the Sacapa lower down, near the point called El Salto.

"Proceeding farther, and crossing several similar spurs of the

Sta. Barbara mountains, I came to a fourth outlet still smaller than the Salala, called Rio Agateca. After passing the considerable town of Sta. Barbara, going northward, following the course of the mountains which border the lake on the west, I reached a fifth outlet, half as large as the Sacapa, called Sezacapa. Farther on, between the towns of Gualala and Ylama, is a sixth outlet, the Yojon, as large as the Sezacapa. A seventh outlet, the Sesecate, of same size with the last-named, occurs 1½ leagues beyond Ylama. All of these flow into the Rio Sta. Barbara, the bed of which is about 1000 feet below the level of the lake.

"On the 17th of May I left the town of Yojoa, situated on the *camino real* leading from the port of Omoa to Comayagua (the capital of the republic of Honduras), to examine an eighth outlet of the lake, called Rio Blanco. This river flows out from the northern extremity of the lake, and looks more like an estuary than a river, with low and muddy banks, without perceptible current, and gradually narrowing until it terminates in a pond of water of about an acre area, situated at the farther extremity of the meadow. In this pond are three deep *pozos* or holes through which the water probably filters into the subterranean channels leading under the hills. When the lake is full, the water is 6 feet deep all over the meadow. The amount of water which appears to escape here falls far short of that which emerges 2 miles distant, where the river Blanco proper rises to the surface, whence I infer that there are other points where the water descends within the lake itself. The river after emerging falls rapidly, and a mile below the point where it rises falls 120 feet at a single bound.

"Two miles to the eastward of the Rio Blanco is a ninth outlet, called Rio Yojoa; and, on the eastern side of the lake, still another, a tenth, with the same characteristics of meadow and channel, with just sufficient current to show the set of the water outward. This makes its appearance after an underground course of 3 miles as the river Uri.

"We have thus *ten* outlets in all—one open and nine subterranean—for greater or less distances. In the month of April all the sources of this lake, even the great spring of Agua Azul, are dry, and the only water in this part of the country comes from this great mountain reservoir. From June to February more water enters the lake than can leave by its subterranean outlets, and the surplus is discharged by the open channel of the Rio Jaitique. As I have said the rain had begun to fall during the night at the time of my visit early in May, and the lake at once commenced to rise, so that on the 1st of June a small flow had been established in the Rio Jaitique."

Mr. Edwards adds that the lake derives its principal supply of water from numerous rills and small streams descending the inner slopes of the mountains of Sta. Barbara and Miambar. Its most remarkable tributary, however, is the great spring of *Agua Azul*, or Blue-water, having its origin in a cattle estate of the same name, and entering the lake about midway of its length on its eastern shore. It is described as "an immense spring of clear blue water, 70 feet across, from which a stream flows into the lake equal in size with any of its outlets."

There is a considerable belt of low, swampy land at the southern extremity of the lake, the greater part of which is overflowed when the lake is full. Beyond the watershed, however, and in the neighbourhood of Taulebé and San José, the country spreads out in beautiful plains and valleys of greatest fertility. Between these and Comayagua, the capital of the state, lies the high *plateau* of Siguatepeque, 3600 feet above the sea, from 2 to 8 miles broad, and 30 miles long. It is remarkably cool and salubrious, wooded with pines and oaks, fertile, and producing the fruits and cereals of the temperate zone in the greatest abundance.

This is the extent of our present information respecting this remarkable lake; and, while it is far from satisfactory in all respects, it cannot fail to arrest the attention of intelligent travellers, and thus lead to a complete exploration. It lies within a day's journey of the proposed Honduras railway, to the agents and engineers of which we are indebted for the imperfect accounts here presented. They will no doubt have followers in the undertaking of an equally inquiring spirit, who will be able to bring to the aid of their researches a larger degree of geological knowledge, which will probably do more to explain the peculiar features of the lake than any amount of topographical information.

It seems certain that the prevailing rock around the lake is the fossiliferous blue limestone, overlying the sandstone and the slates, and found crowning nearly all the hills bordering the line of the proposed railway from Port Cortez to Comayagua. Near the coast, in the mountains of Omoa, but of course of a much lower formation, are vast beds of pure white marble, brilliant in colour, fine grained, and compact. Beneath these is found a metamorphic sandstone. Altogether it seems that the mountains around Lake Yojoa are of the blue limestone alluded to, probably uplifted by volcanic agencies, of which the whole country shows extraordinary effects, and that the waters of the lake find their way through breaks and rents occurring on the plane where the limestone meets the underlying sandstone. In other words, that the lake of Yojoa lies in a great limestone basin, full of cracks and fissures due to volcanic convulsions, through which its waters sink to the upper surface of the sandstone, and here find their way through other or continuous fissures of the superior rock, until they emerge to light again where the sandstone itself crops out, and the limestone ceases.